Critical thinking is still critical

An institutional approach to assessing an enduring competency

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Image credit:
Nasher Museum of Art

Session plan

Background

Align general education and programmatic assessment of critical thinking

(Standard 8.2.a)

Describe our study of Critical Thinking in the general education

Administration • Instrumentation • Analysis • Understanding

(Standard 8.2.b)

Strategies to evaluate and deploy an instrument

Duke belongs to SACSCOC reaffirmation class of 2019.

Previous 2009-2019 QEP focused on Globalization and Global/Intercultural Learning.

Current 2019-2029 QEP focuses on excellence in undergraduate education in students' first contacts with the field of study, especially those occurring in the first two years of college.

To understand how critical thinking is represented in undergraduate education at Duke, we need to look at the curriculum.

Bloom: Levels of cognitive development

Piaget: Stages of cognitive development

King & Kitchener: Theories of reflective judgment and reflective practice

AAC&U: Critical thinking VALUE rubric

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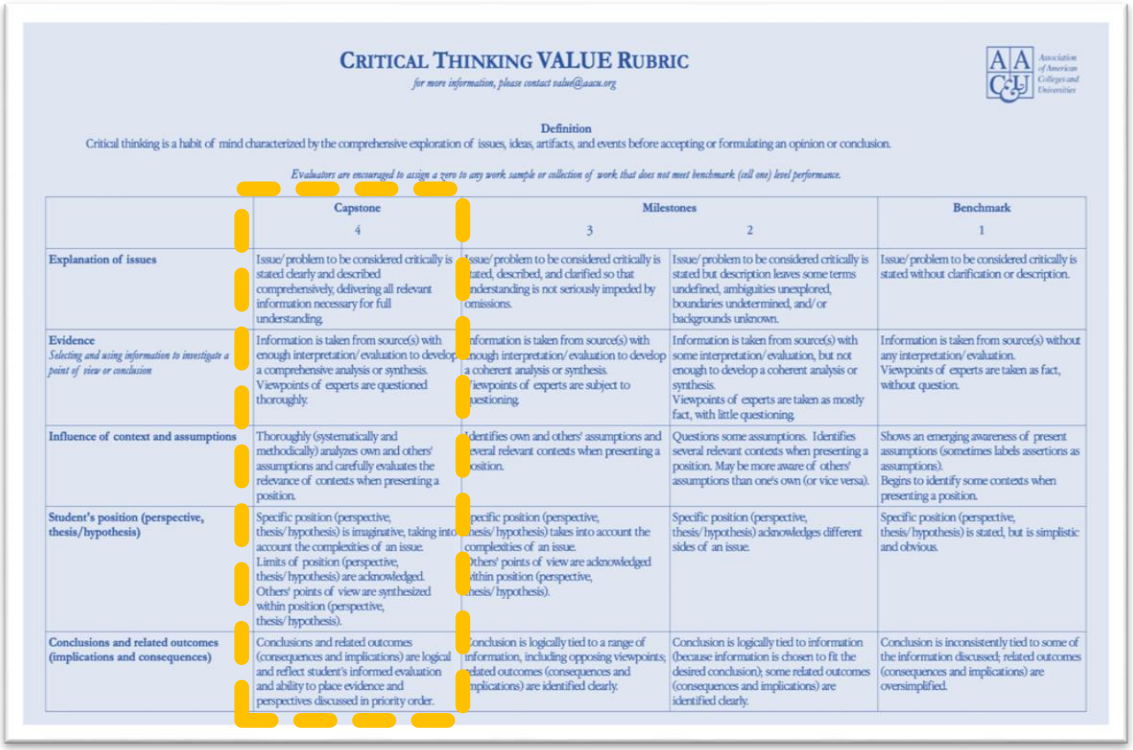
Crowd-sourcing a definition of critical thinking

Option 1 (on the web)	Option 2 (by text)
In a web browser, open **bit.ly / critical_thinking_poll** Type in your definition of critical thinking.	On your phone, text: **JenniferHill462** to number **22333** Then text your definition of critical thinking.

Admin page: https://www.polleverywhere.com/free_text_polls/XhprPhvJex55heomPm7DJ



CRITICAL THINKING VALUE RUBRIC

for more information, please contact value@aacu.org

Definition

Critical thinking is a habit of mind characterized by the comprehensive exploration of issues, ideas, artifacts, and events before accepting or formulating an opinion or conclusion.

Evaluators are encouraged to assign a zero to any work sample or collection of work that does not meet benchmark (cell one) level performance.

	Capstone 4	Milestones 3	Milestones 2	Benchmark 1
Explanation of issues	Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Our operational definition of critical thinking largely is based on the VALUE definition and capstone levels.

https://www.aacu.org/value/rubrics/critical-thinking

Critical thinking learning outcomes:

A. Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.

B. Information is taken from source(s) with enough interpretation/evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.

C. Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.

D. Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).

E. Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.

CRITICAL THINKING VALUE RUBRIC

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Association of American Colleges and Universities

Definition

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Evaluators are encouraged to assign a zero to any work sample or collection of work that does not meet benchmark (cell one) level performance.

	Capstone	Milestones		Benchmark
	4	3	2	1
Explanation of issues	Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated without clarification or description.
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https://www.aacu.org/value/rubrics/critical-thinking

Background

Arts, Literature, or Performance (2)

Civilizations (2)

Natural Sciences (2)

Quantitative Studies (2)

Social Sciences (2)

Cross-cultural Inquiry (2)

Ethical Inquiry (2)

Foreign Language (1-3)

Research (2)

Science, Technology, Society (2)

Writing (3)

Arts, Literature, or Performance (2)

Civilizations (2)

Natural Sciences (2)

Quantitative Studies (2)

Social Sciences (2)

Requirements of the major

Cross-cultural Inquiry (2)

Ethical Inquiry (2)

Foreign Language (1-3)

Research (2)

Science, Technology, Society (2)

Writing (3)

Background

There's great freedom for students to craft an authentic and purposive pathway.

BUT

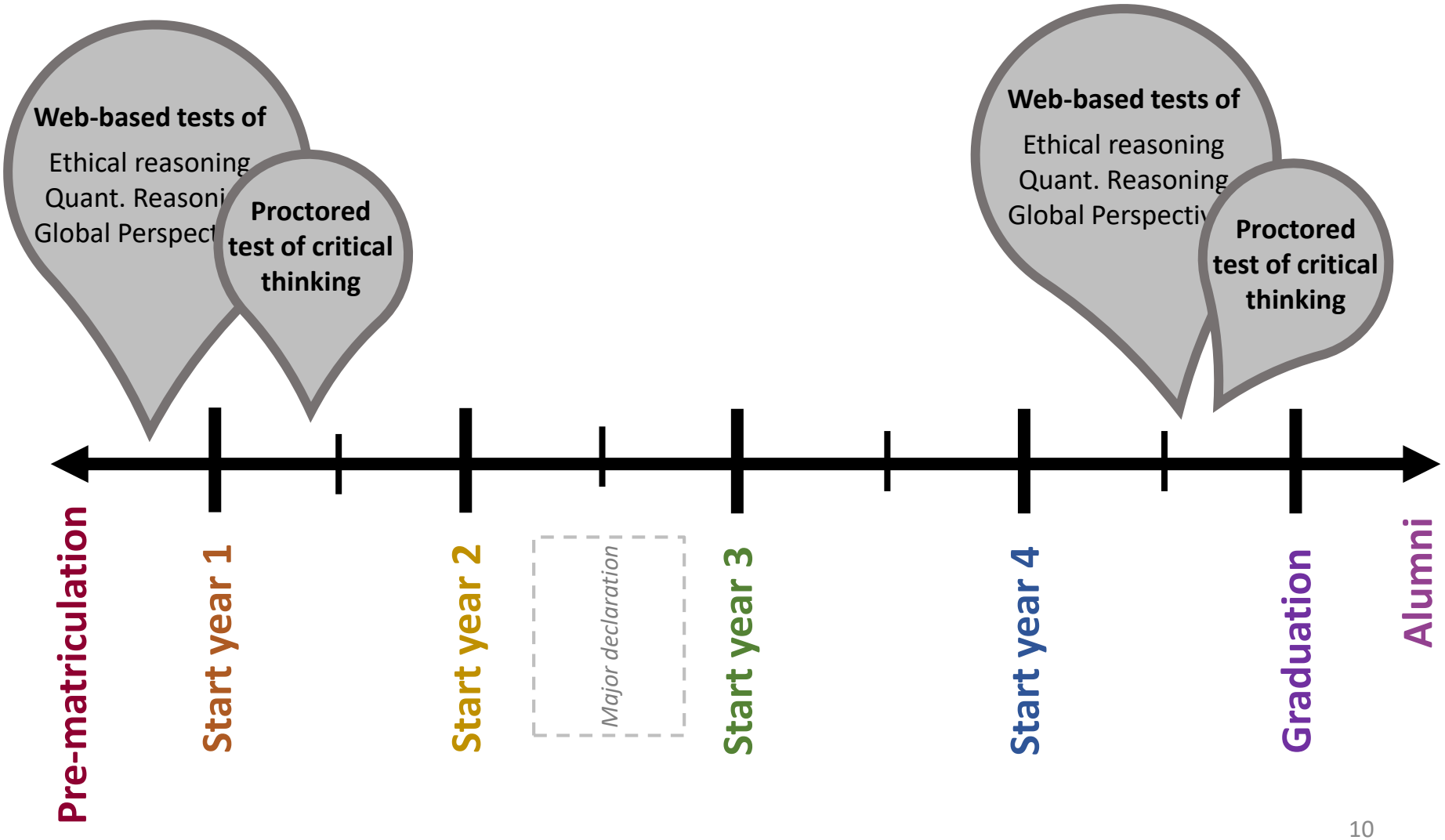
There are challenges for advising and planning.

Students can face uncertainty.

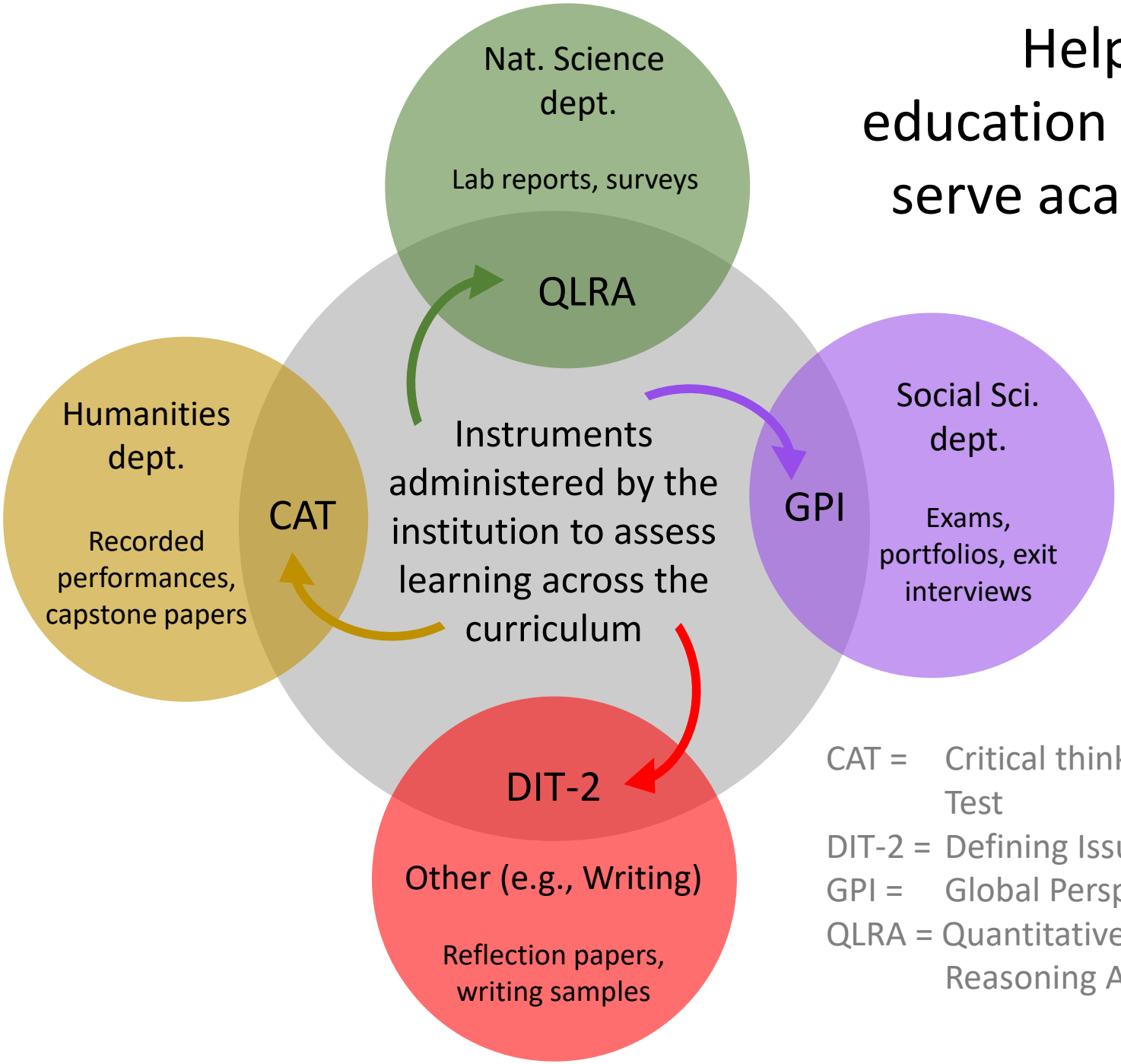
It's hard to study the impact of the curriculum.

Background

Initial model of general education test administration

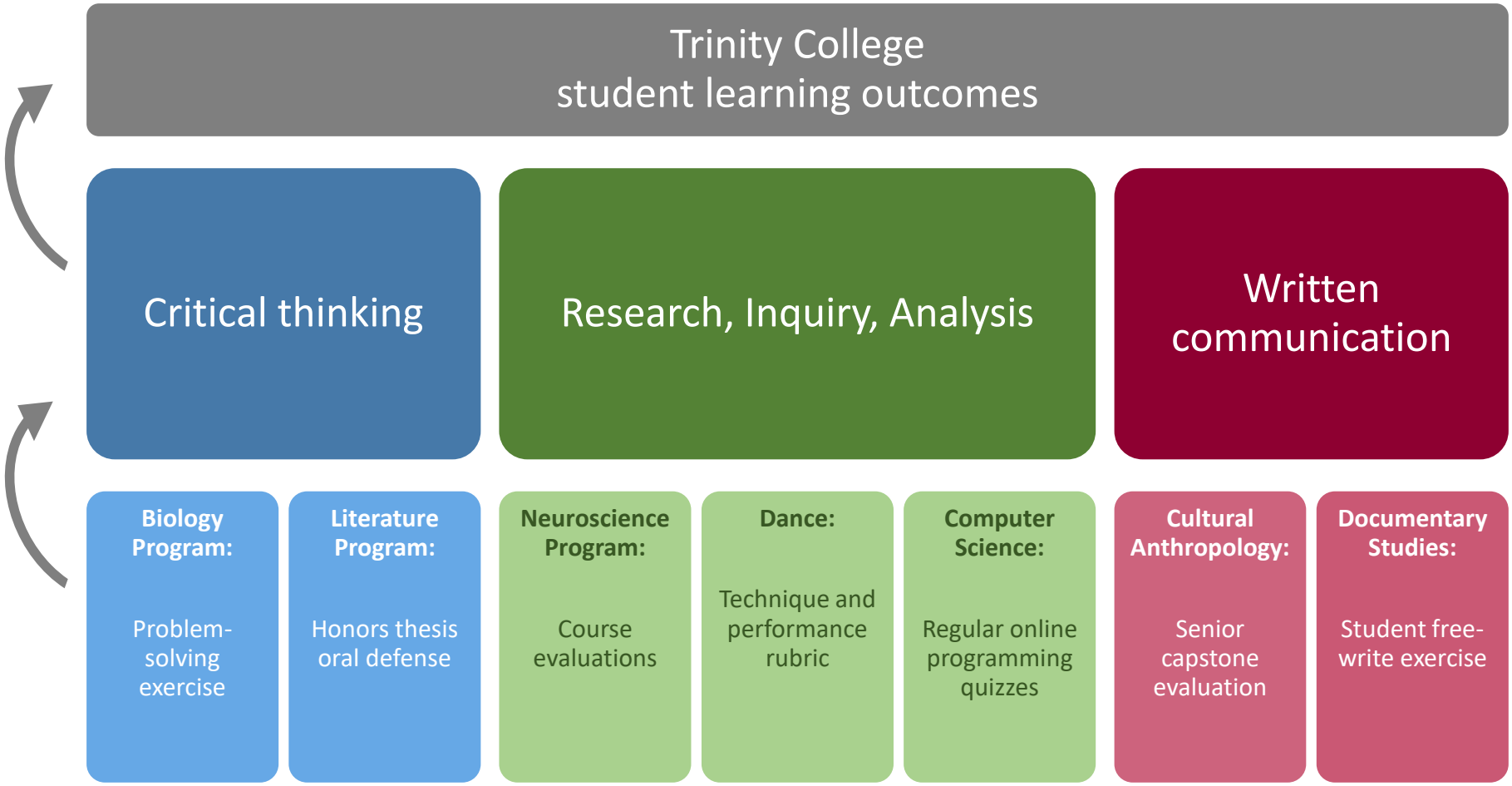


Helping general education assessment serve academic units

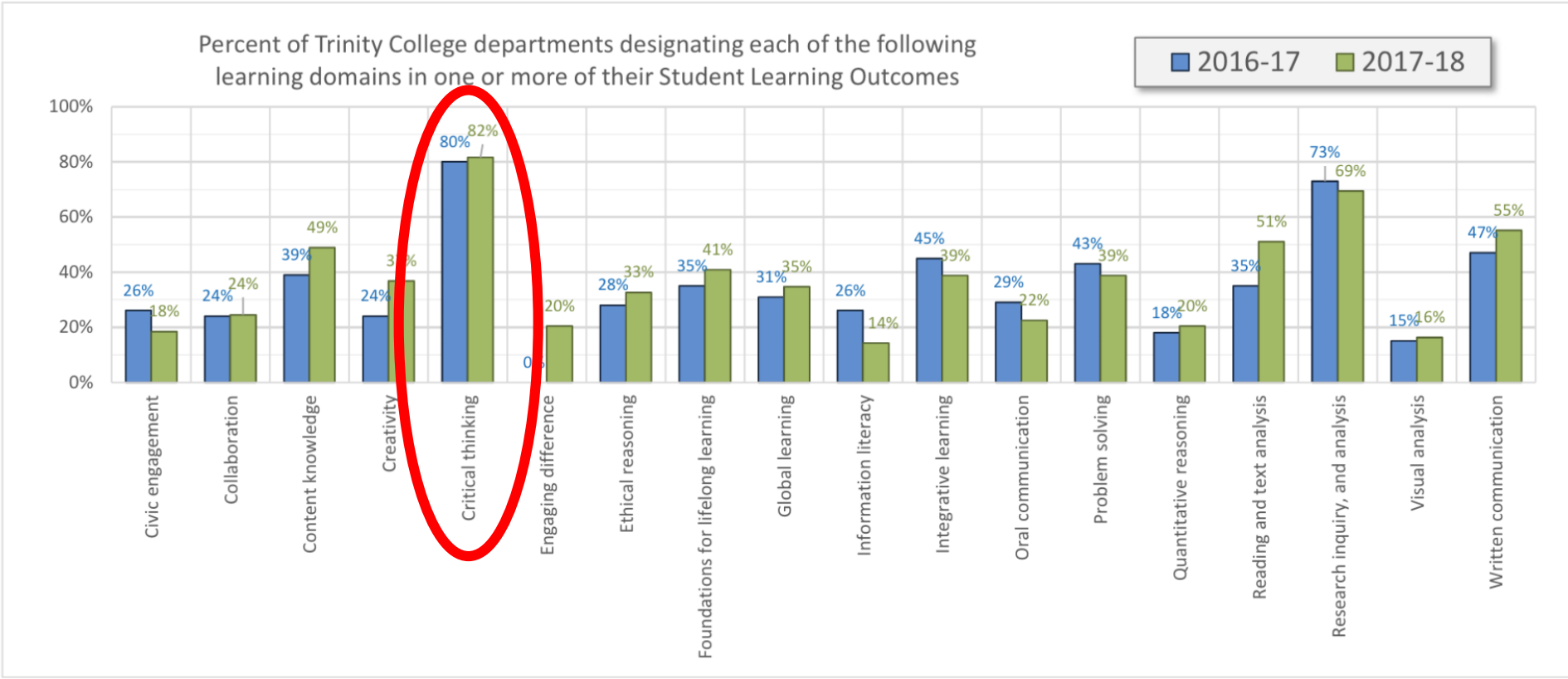


CAT = Critical thinking Assessment Test
DIT-2 = Defining Issues Test
GPI = Global Perspectives Inventory
QLRA = Quantitative Literacy and Reasoning Assessment

Using program assessment to illustrate Gen Ed learning outcomes



Aligning general education & program assessment



SECTION 8: Student Achievement

2. The institution identifies expected outcomes, assesses the extent to which it achieves these outcomes, and provides evidence of seeking improvement based on analysis of the results in the areas below:

a. Student learning outcomes for each of its educational **programs**.

b. Student learning outcomes for collegiate-level **general education** competencies of its undergraduate degree programs.

Measures and data are used and shared between program-level and general education assessment.

c. *Academic and student services that support student success. [Not addressed in this session.]*

http://www.sacscoc.org/pdf/2018PrinciplesOfAcreditation.pdf

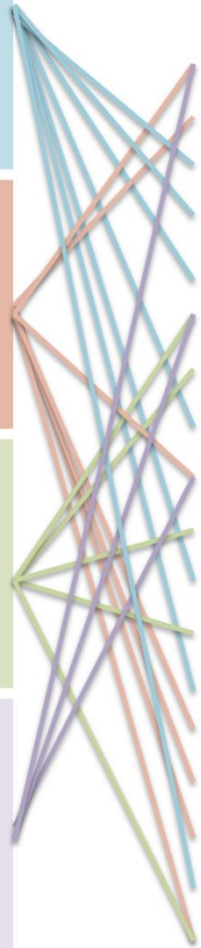
Aligning general education & program assessment

Provide a superior liberal education to undergraduate students, attending not only to their intellectual growth but also to their development as adults committed to high ethical standards and full participation as leaders in their communities.

Advance the frontiers of knowledge and contribute boldly to the international community of scholarship.

Promote an intellectual environment built on a commitment to free and open inquiry.

Promote a deep appreciation for the range of human difference and potential, a sense of the obligations and rewards of citizenship, and a commitment to learning, freedom and truth.

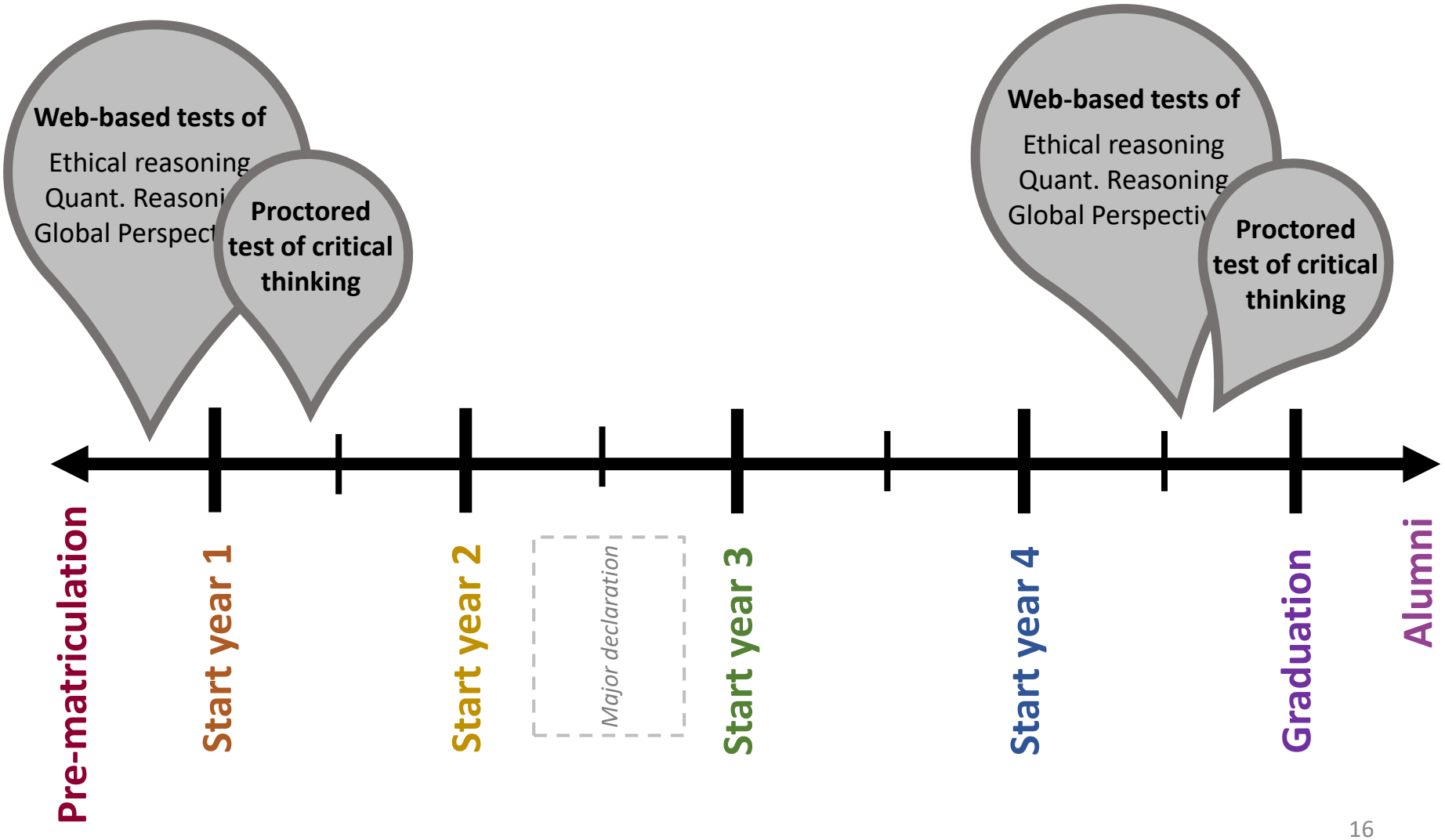


	Percentage of Trinity College Programs manifesting this domain in at least one SLO	
	2016-17	2017-18
Civic engagement	26%	18%
Collaboration	24%	24%
Content knowledge	39%	49%
Creativity	24%	37%
Critical thinking	80%	82%
Engaging difference	0%	20%
Ethical reasoning	28%	33%
Foundations for lifelong learning	35%	41%
Global learning	31%	35%
Information literacy	26%	14%
Integrative learning	45%	39%
Oral communication	29%	22%
Problem solving	43%	39%
Quantitative reasoning	18%	20%
Reading and text analysis	35%	51%
Research inquiry, and analysis	73%	69%
Visual analysis	15%	16%
Written communication	47%	55%

https://trinity.duke.edu/about

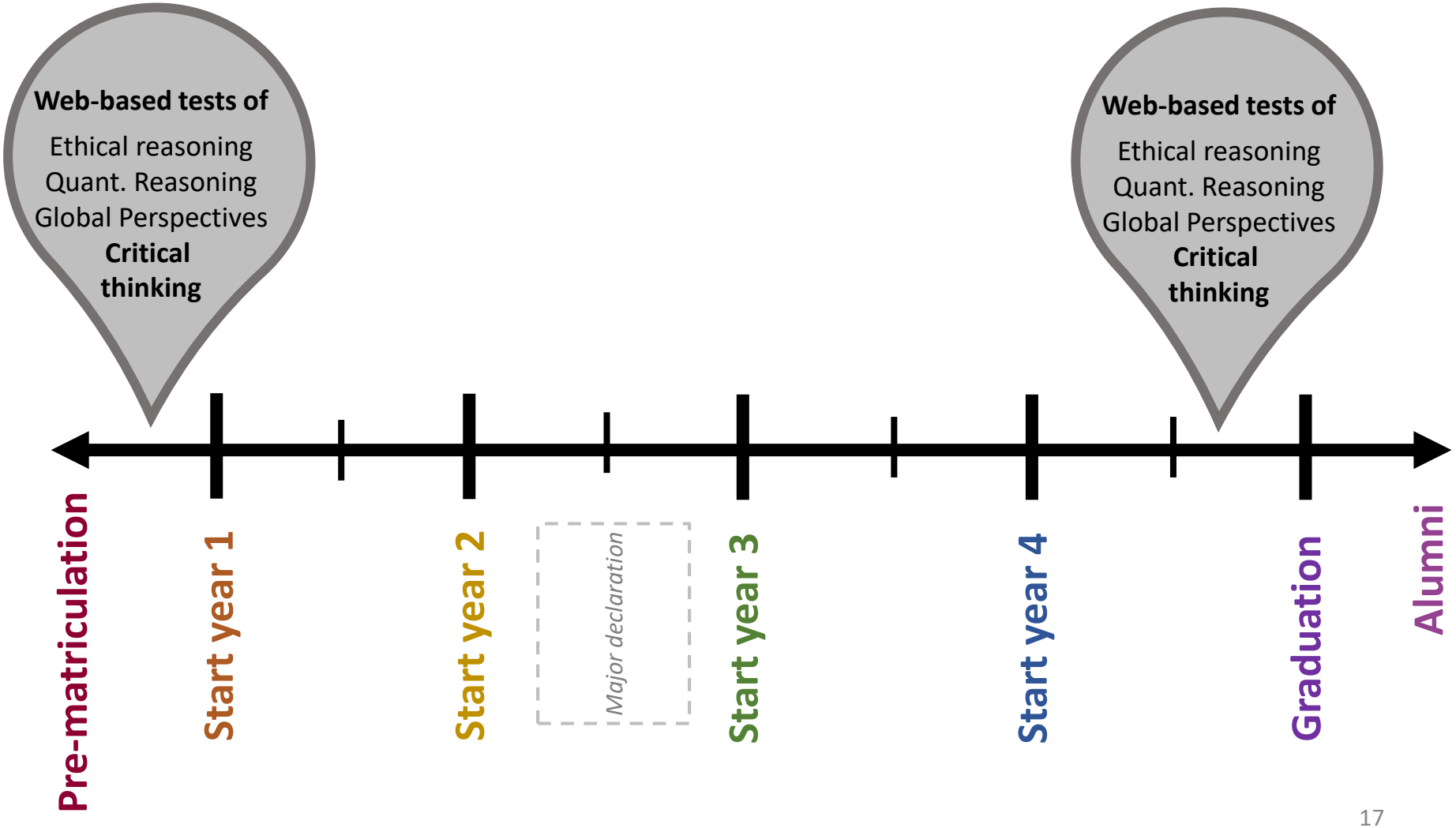
Background

Initial model of general education test administration

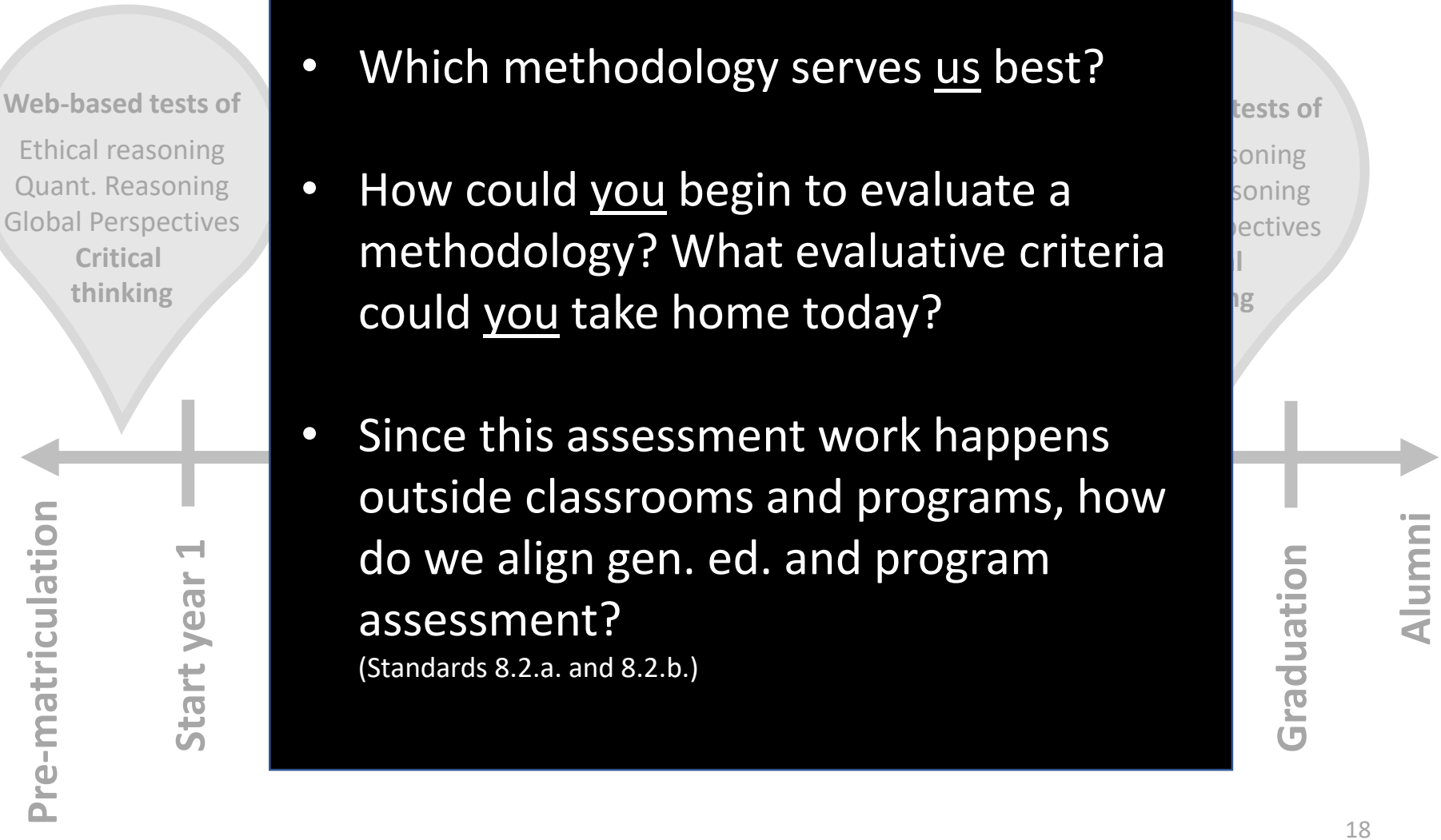


Background

Revised model of general education test administration



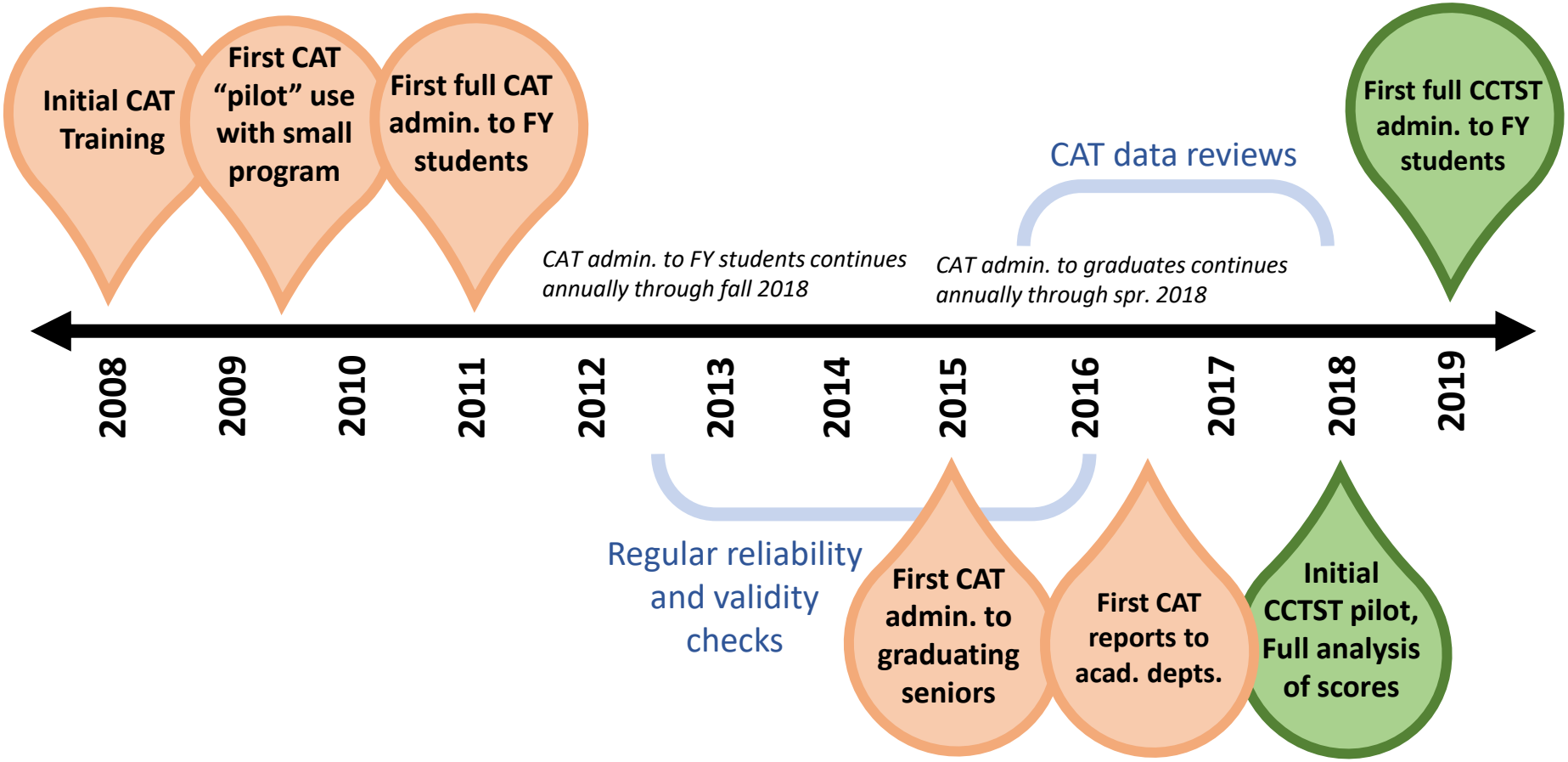
Revised model of general education test administration



- Which methodology serves us best?
- How could you begin to evaluate a methodology? What evaluative criteria could you take home today?
- Since this assessment work happens outside classrooms and programs, how do we align gen. ed. and program assessment?

(Standards 8.2.a. and 8.2.b.)

Brief critical thinking study timeline



About the CAT

The Critical thinking Assessment Test (CAT)

www.tntech.edu / cat

Characteristics

Paper & paper written test (not computer-mediated)

In-person proctored

15 questions spanning four constructs

Requires 45-90 minutes per student

We incentivized participation; different incentives for FYs and seniors

Scored by a team of faculty and/or graduate students

Required rater training and ongoing recalibration

Our capacity was approx. 300 students annually, splitting FY and senior

About the CAT

The Critical thinking Assessment Test (CAT)

www.tntech.edu / cat

Advantages

Develops faculty and future faculty interested in assessment

We have a direct role in the evaluation of critical thinking

Questions represent real situations

Coursework and/or tests can be modeled after CAT questions

Our concerns

We have limited scoring capacity

High labor demand for a small office

We had trouble seeing movement from FY to senior year (Motivation?)

Faculty were unsure how to interpret and use the findings (Small Ns)

Recruitment	Voluntary participation
Administration	Mass email invitation to full cohort
	Sign-up via web form (Qualtrics), with waitlist
Scoring	Small award to each participant
	Larger drawing across all participants
Findings	Approx. 150 FY students in the fall
Reporting	Approx. 150 senior students in the spring

Recruitment

Administration

Scoring

Findings

Reporting

On-campus room reservations

Approx. 15 testing sessions, with 10-30 students each

Mostly Sundays, with some evenings

Test packets provided by TnTech;
we provide consent and release forms

Electronic record keeping, including maintaining test and subject IDs

Recruitment

Administration

Scoring

Findings

Reporting

Faculty raters preferred;
we hired and paid graduate students

Weekend scoring sessions

At our peak, a team of 10 veteran raters could score 150 tests in 8 hours (with breaks)

Regular review of rater reliability metrics

Ongoing training, especially onboarding new raters

Recruitment

Administration

Scoring

Findings

Reporting

Cohort average exceed the national mean for Research Extensive institutions

Changes from year 1 to year 4 are variable, ambiguous

Low Ns due to our limited scoring capacity complicate analysis

Causation is impossible to determine. Students have highly variable academic pathways → many confounding factors

Recruitment

Administration

Scoring

Findings

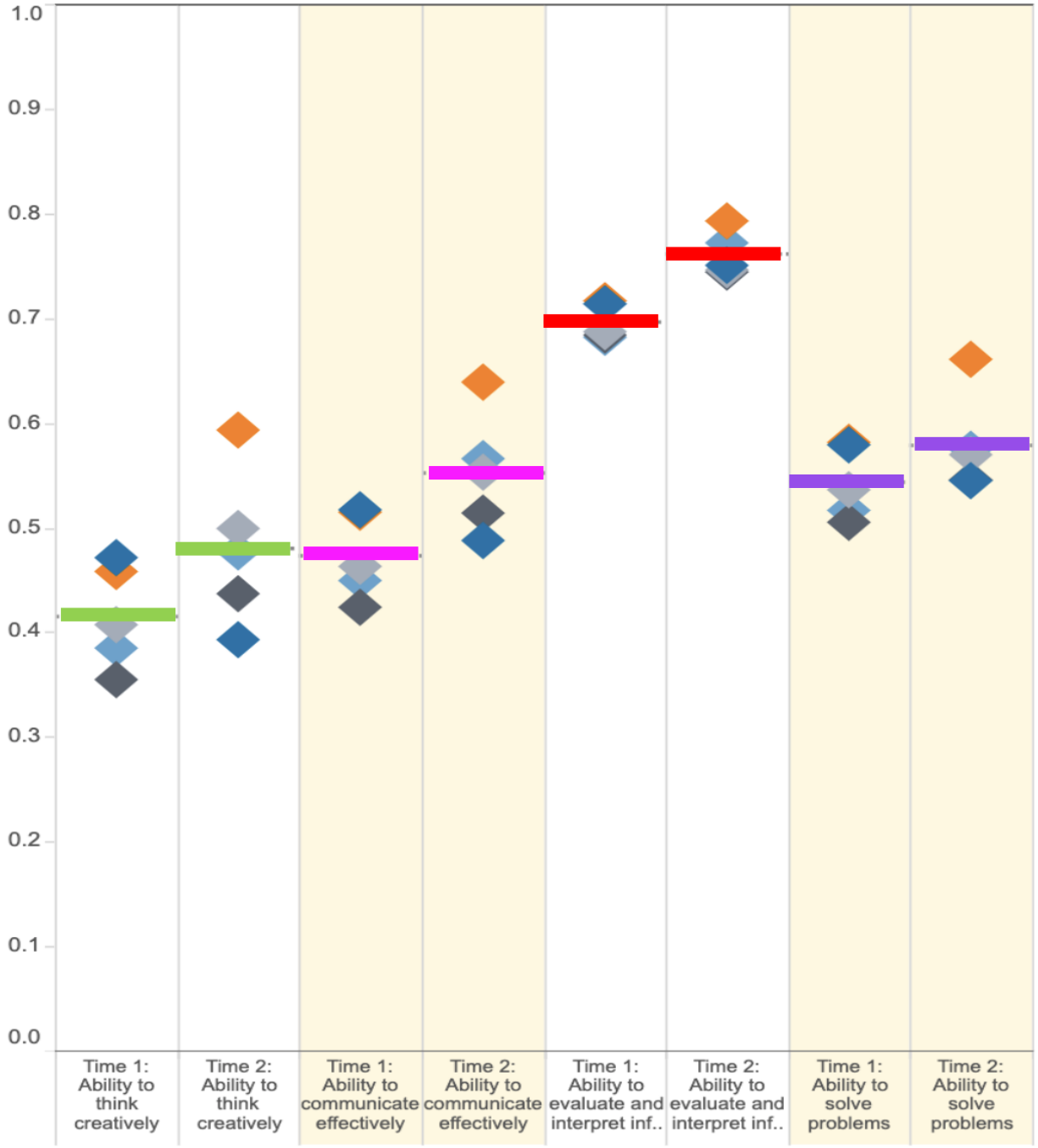
Reporting

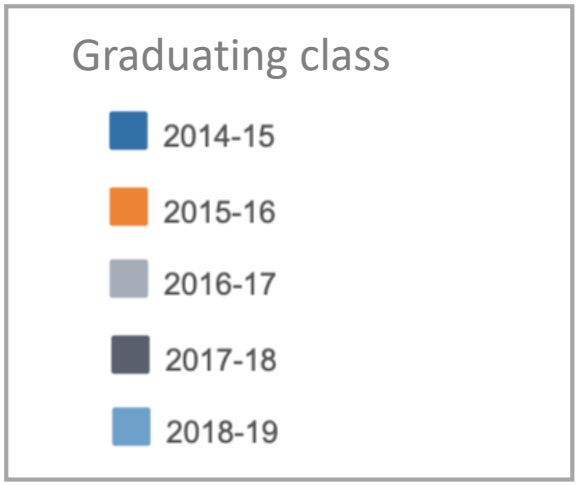
Aggregate results reported to Trinity College leadership annually (narrative)

Aggregate results for students in each major/minor reported to the academic department (Tableau data dashboards)

Results letters sent to student via email, with explanatory context and group benchmarks

We use pre-test results to support recruitment of seniors in year 4





Aggregating graduating classes, it looks like there's an increase!

But Ns for repeating students often are small due to our scoring capacity.

Usefulness declines when we try to sort results for individual departments.

CAT scores, first-year to fourth-year

Students affiliated with your major, minor, and/or certificate

	2014-15	2015-16	2016-17	2017-18	2018-19	Average
Time 1, Q1: Summarize figure without making inappropriate inferences	1.00	1.00	0.50	1.00	0.00	**0.70**
Time 2, Q1: Summarize figure without making inappropriate inferences	1.00		1.00	1.00		**1.00**
Time 1, Q2: Determine how well evidence supports a hypothesis	0.50	0.33	0.50	0.67	0.33	**0.47**
Time 2, Q2: Determine how well evidence supports a hypothesis	0.78		0.73	0.67		**0.73**
Time 1, Q3: Provide alternative explanations for evidence	0.33	0.33	0.17	0.33	0.33	**0.30**
Time 2, Q3: Provide alternative explanations for evidence	0.33		0.53	0.78		**0.55**
Time 1, Q4: Identify types of information to evaluate hypothesis	0.25	0.25	0.13			
Time 2, Q4: Identify types of information to evaluate hypothesis	0.25		0.60			
Time 1, Q5: Judge whether data support a hypothesis	0.00	1.00	1.00			
Time 2, Q5: Judge whether data support a hypothesis	1.00		1.00			
Time 1, Q6: Provide alternative explanations for evidence	0.50	0.83	0.33			
Time 2, Q6: Provide alternative explanations for evidence	0.78		0.73	0.89		**0.80**
Time 1, Q7: Identify types of information to evaluate hypothesis	0.25	0.25	0.00	0.00	0.50	**0.20**
Time 2, Q7: Identify types of information to evaluate hypothesis	0.17		0.30	0.00		**0.16**
Time 1, Q8: Judge whether data support a hypothesis	1.00	1.00	1.00	1.00	1.00	**1.00**
Time 2, Q8: Judge whether data support a hypothesis	1.00		0.80	1.00		**0.93**

Graduating class 2016-17
N: 5
Mean: 0.53
St. Dev.: 0.1826

We reached a point where we had to think seriously about trade-offs and limitations.

We have a professional responsibility to continue learning about and discussing ways to study core learning outcomes.

Exploring Alternative Instruments

Considerations

Exploring the CCTST

The California Critical Thinking Skills Test (CCTST)

https://insightassessment.com/article/california-critical-thinking-skills-test-cctst-2

Characteristics

Computer-mediated

Forty multiple choice questions spanning seven constructs

Requires 45-50 minutes per student

Scored automatically, electronically, without participation from faculty and instructors

We incentivized participation; different incentives for FYs and seniors

Recruitment	Voluntary participation
Administration	Email invitation to designated subset of cohort
	Small award to each participant
Scoring	Larger drawing across all participants
Findings	Approx. 150 FY students in the pre-matriculation pilot. Sent summer before arriving to campus.
Reporting	Approx. 100 senior students in the spring pilot.

Recruitment	Instruction for completion included in invitation email
Administration	Administered online during timed session
Scoring	Non-proctored session – completed at students convenience
Findings	Electronic record keeping, including maintaining test and subject IDs
Reporting	

Recruitment

Administration

Scoring

Findings

Reporting

Scored electronically

Results immediately available to students and test administrators

Multiple choice questions remove test administrators from scoring process

Scores are calculated by construct – not by individual question

Recruitment

Administration

Scoring

Findings

Reporting

Cohort average exceeded national means

Only cross-sectional data currently available - results between year 1 and year 4 variable, somewhat ambiguous

Causation is impossible to determine. Students have highly variable academic pathways → many confounding factors

Low Ns during pilot phase – plans to increase N in future terms.

Recruitment

Administration

Scoring

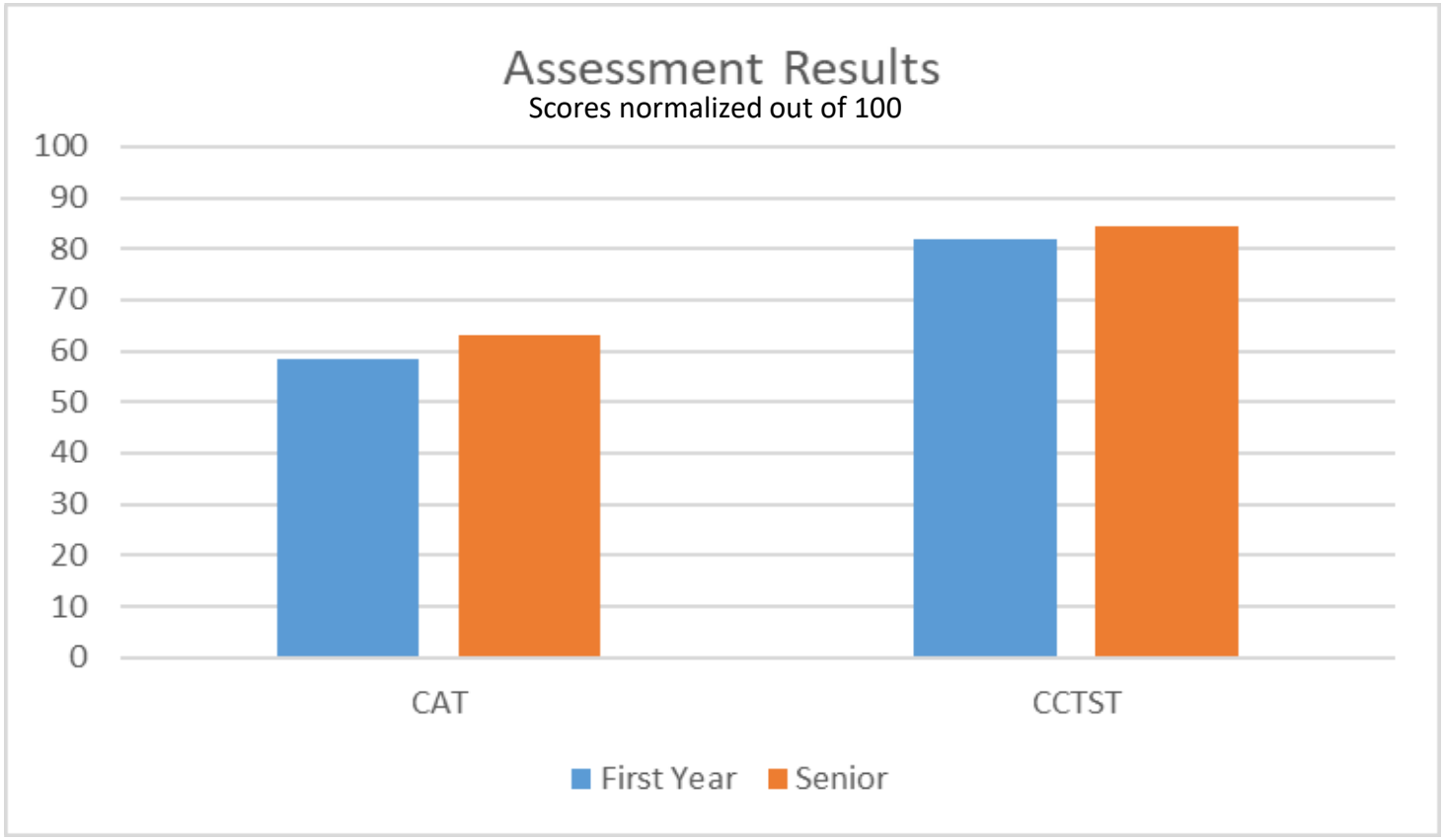
Findings

Reporting

Individual participant reports are provided to students at the completion of the test

Internal reporting tools for CCTST data are currently under development

Exploring Alternative Instruments

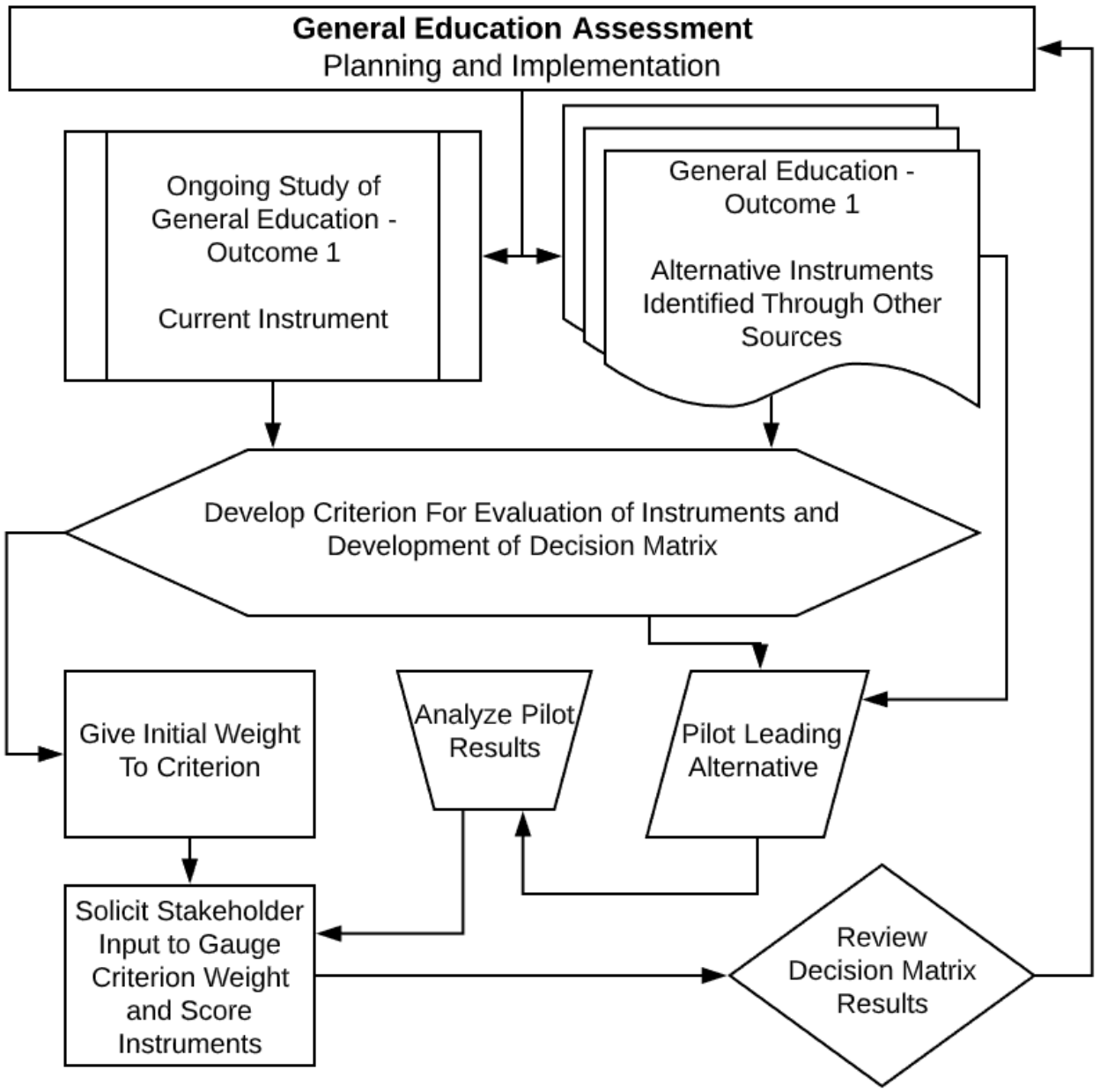


→ We are interested in movement between first-year and senior year, including ceiling effects.

→ Scores are not the only consideration in instrument selection.

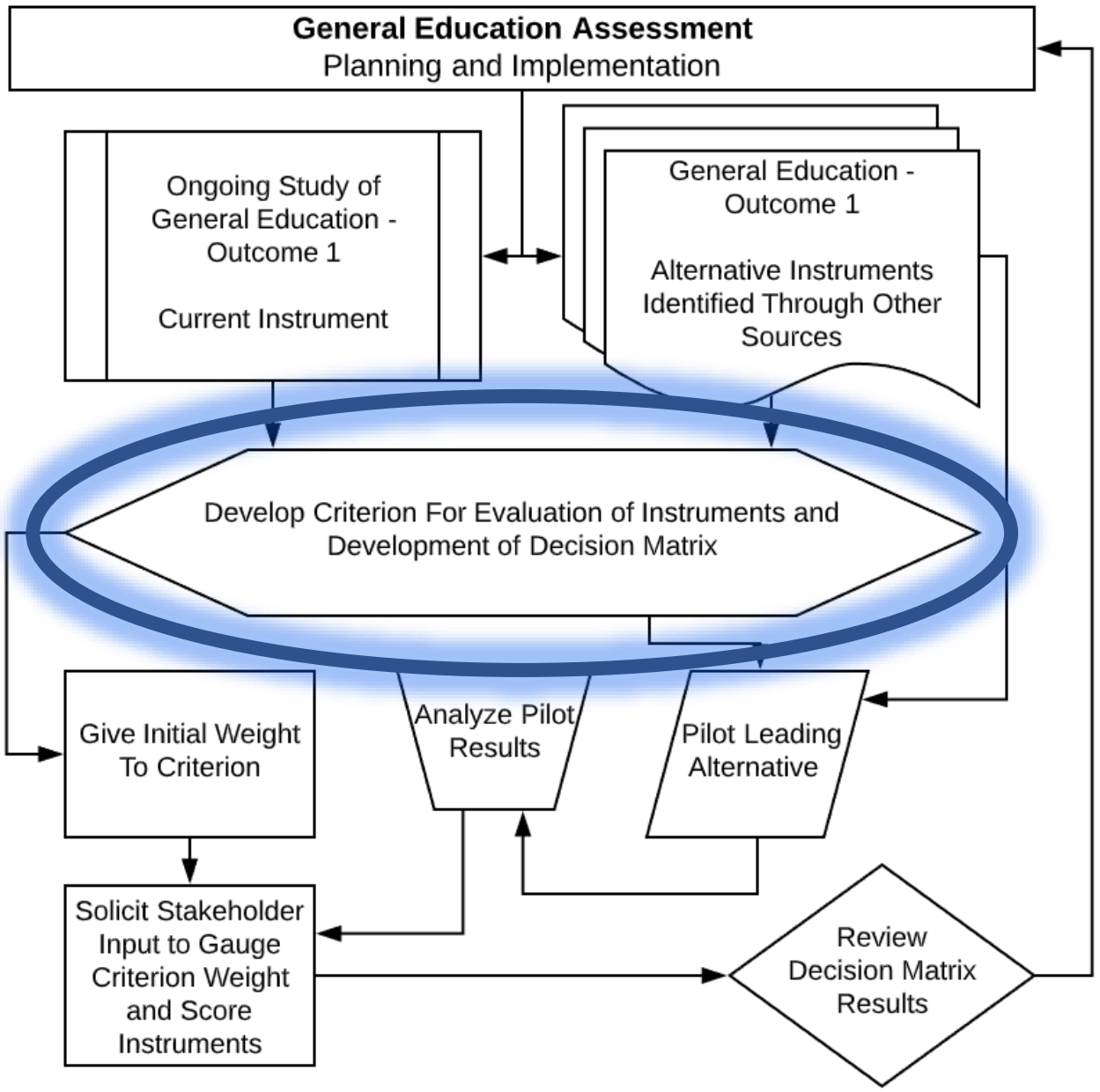
Exploring Alternative Instruments

Review process



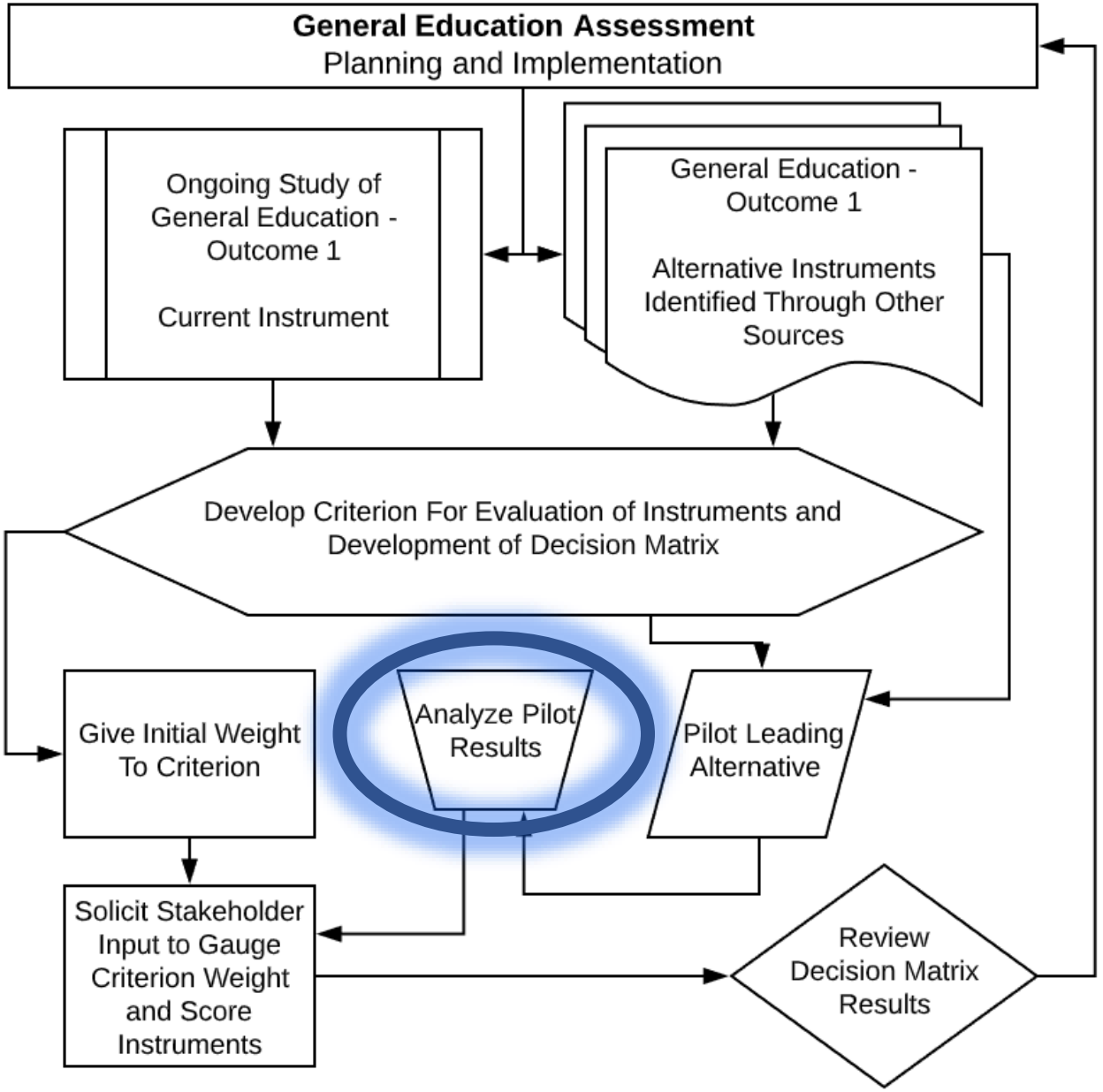
Exploring Alternative Instruments

Review process



Exploring Alternative Instruments

Review process



Weighted Decision Matrix

Useful quantitative technique to help guide decision making

Helpful in evaluating a set of choices against a set of important criteria

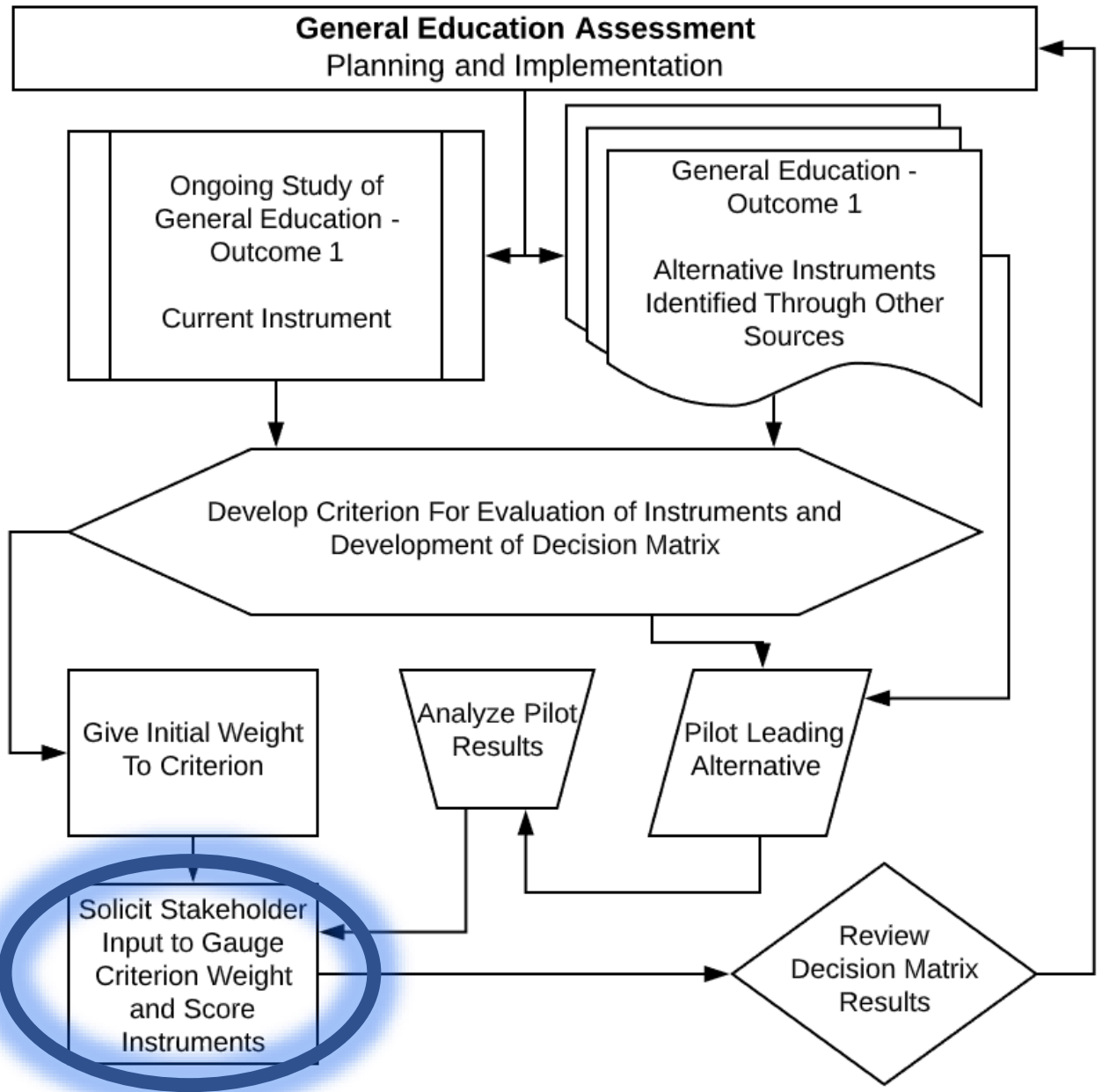
Most helpful when faced with:

- Multiple options
- Multiple decision criteria
- Varying degrees importance among criteria

Helps remove emotion and guesswork from the decision making process

Exploring Alternative Instruments

Review process



Exploring Alternative Instruments

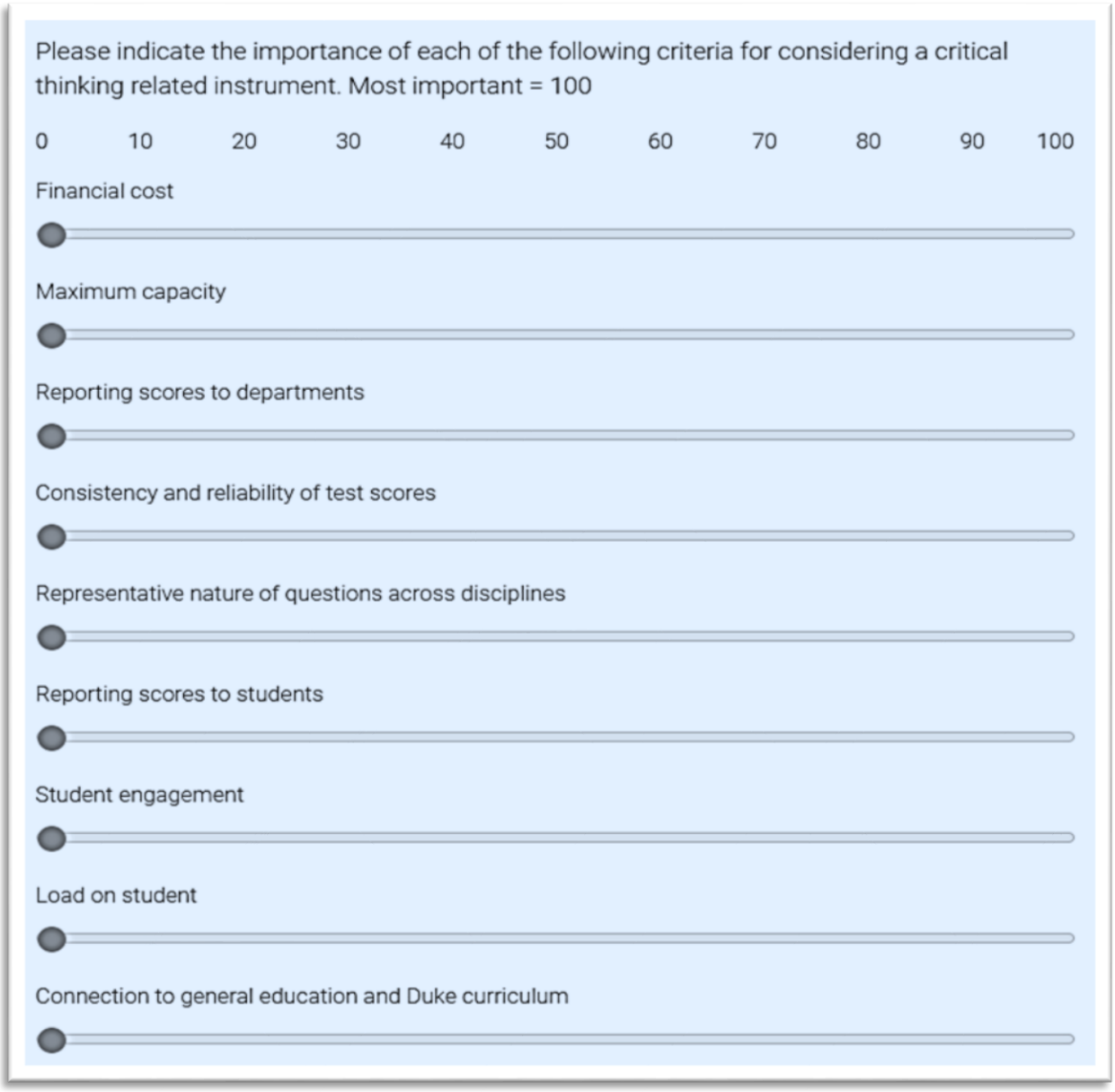
Duke UNIVERSITY

Before continuing to the next page please refer to the CAT-CCTST comparison primer for information related to both instruments. This primer includes relevant information for each of the elements being judged. You may wish to leave the primer open for reference when responding.

Paper copies of the CAT are available for review and screenshots of the CCTST are available for review by clicking the following link: CCTST screen shots .

→

Exploring Alternative Instruments



Decision makers were asked to indicate degree of importance for each of the relevant criteria.

This guided the weighting process for the various criteria during the instrument evaluation period.

Exploring Alternative Instruments

No instrument is perfect.

Different institutional factors will influence the ideal solution.

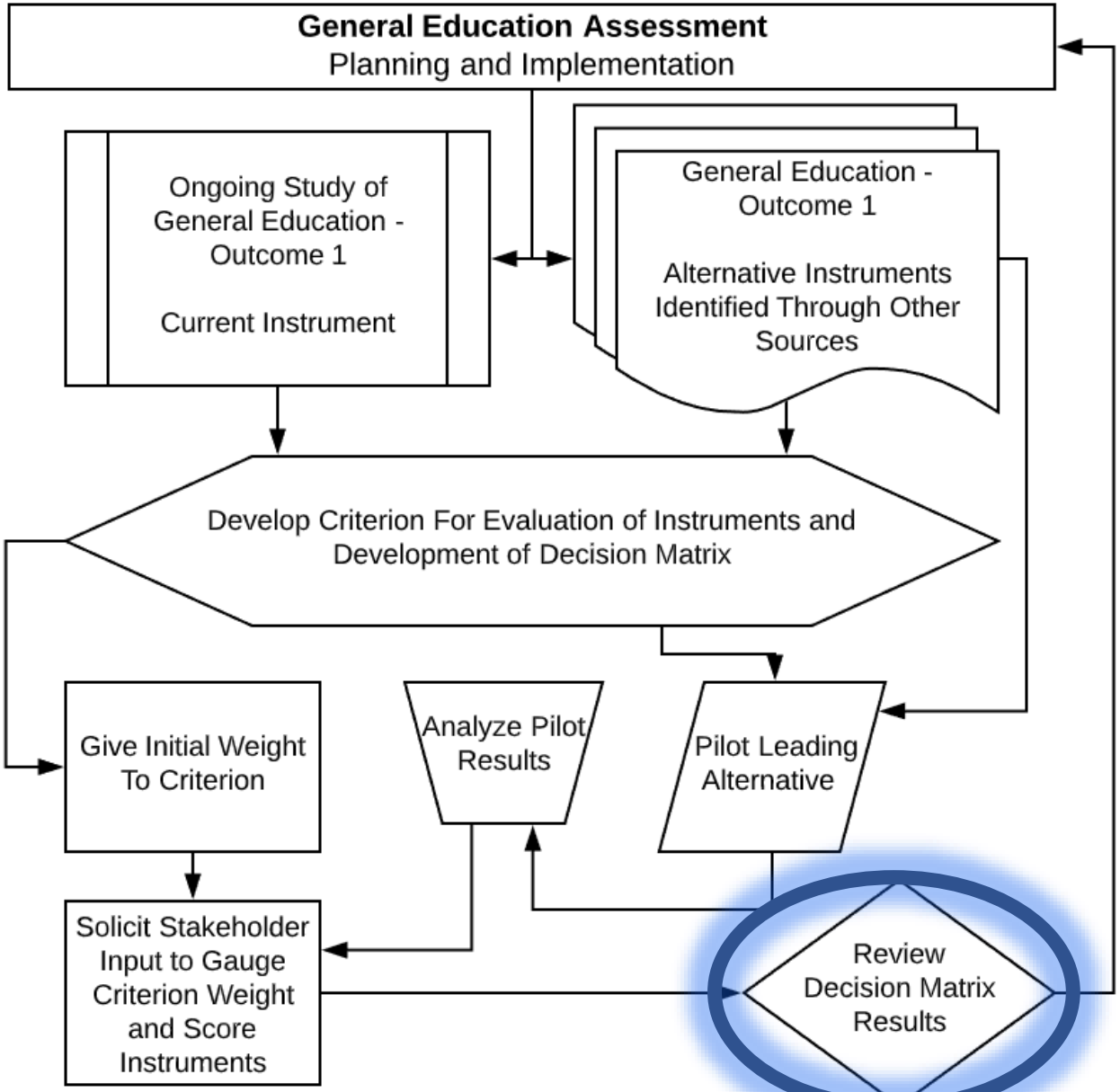
We answer: *How close is each option to the ideal solution for our institution?*

Please respond to the criteria below based on the closeness of the CAT to the ideal Critical Thinking related instrument.

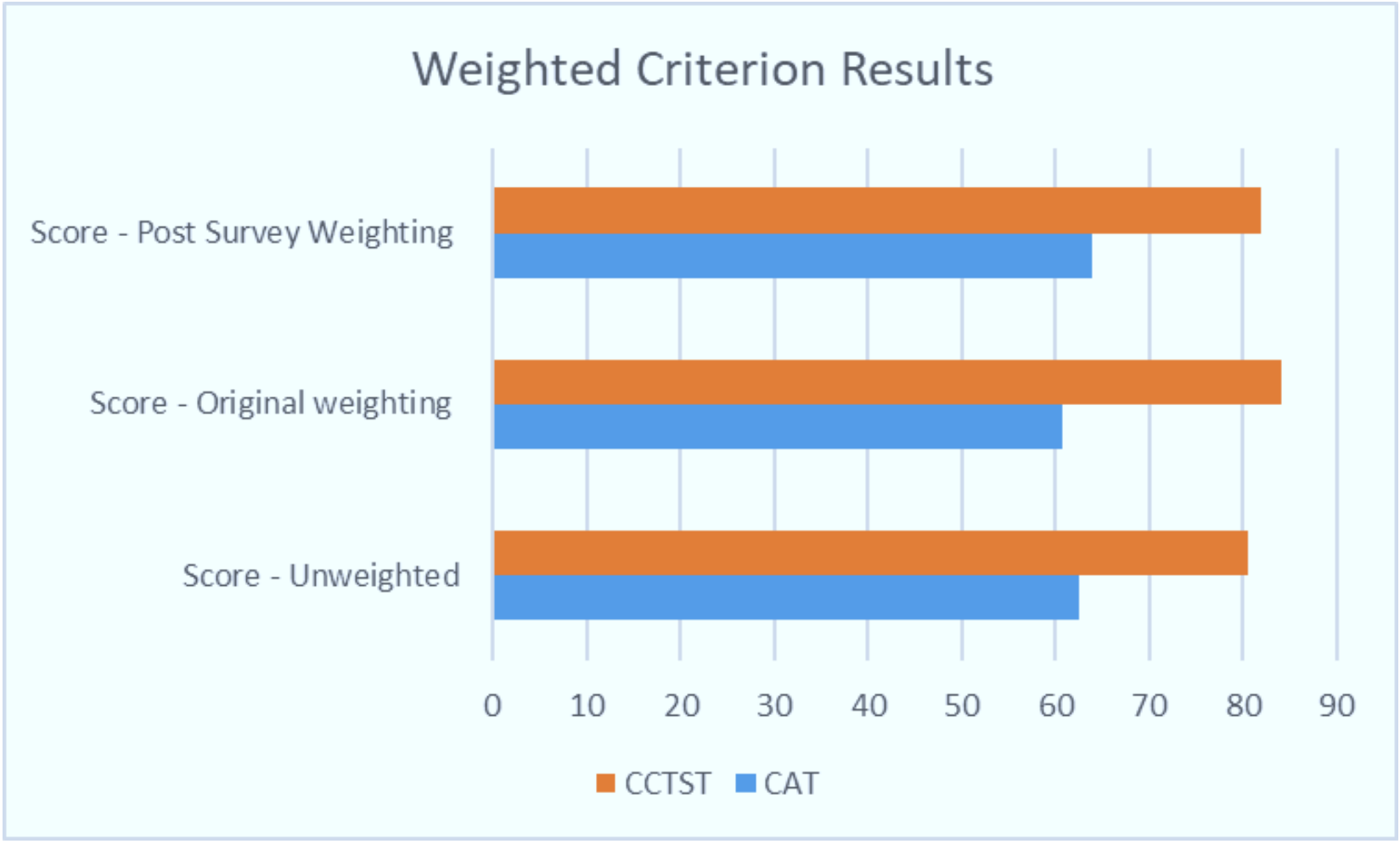
	Extremely close to the ideal	Very close to the ideal	Moderately close to the ideal	Slightly close to the ideal	Not close to the ideal
Financial cost	○	○	○	○	○
Administrative hours	○	○	○	○	○
Integration with faculty/graduate students	○	○	○	○	○
Maximum capacity	○	○	○	○	○
Consistency and reliability of test scores	○	○	○	○	○
Ease of use of results	○	○	○	○	○
Transparency	○	○	○	○	○
Load on student	○	○	○	○	○
Student engagement	○	○	○	○	○
Representative nature of questions across disciplines	○	○	○	○	○

Exploring Alternative Instruments

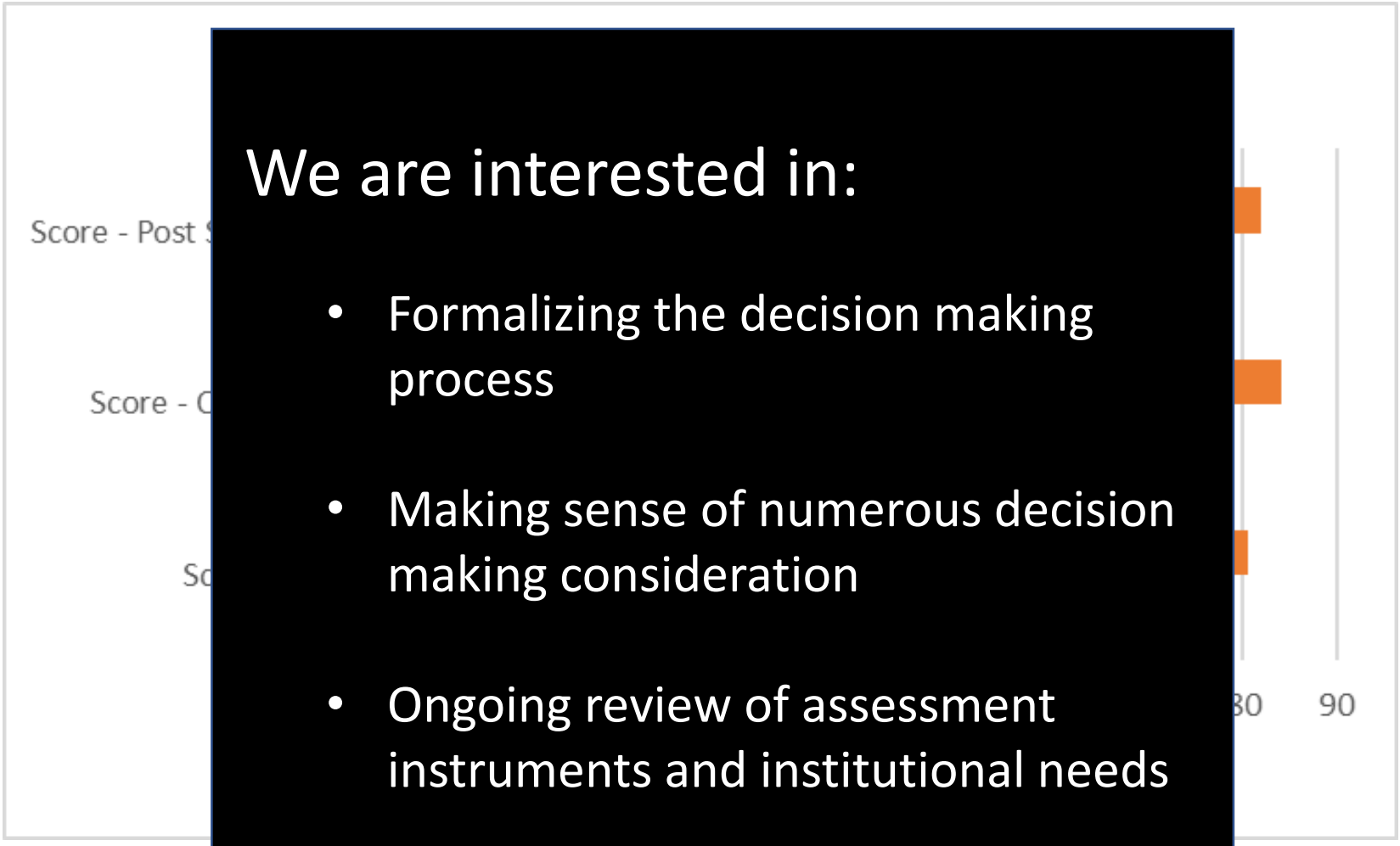
Review process



Exploring Alternative Instruments



Exploring Alternative Instruments



We are interested in:

- Formalizing the decision making process
- Making sense of numerous decision making consideration
- Ongoing review of assessment instruments and institutional needs

Some conversation starters to bring home:

- Do we have any information on critical thinking? What does it tell us?

- How we are sharing evidence with academic and co-curricular partners? Is it working for them?

- What are the essential characteristics of an effective assessment strategy?

- How are we coming to consensus about the factors by which we create a strategy?

- Do we have a roadmap for the evaluation of measures?

What's Next For Us?

- Review of other general education outcomes and instruments
  - Critical Thinking
  - Quantitative Literacy
  - Ethical Reasoning and Moral Development
  - Global Perspectives and Intercultural Competency

Critical thinking is still critical

An institutional approach to assessing an enduring competency

Jennifer Hill, EdD

Evan Widney, MA

Alessandra Dinin, PhD

Office of Assessment
Trinity College at
Duke University

SACSCOC Annual Meeting
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